

Risk of Instant Flash Fire during Cylinder Maintenance

Several incidents have recently been reported to EIGA that have highlighted the importance to conduct appropriate risk analysis for the process of cleaning cylinder neck threads and to take appropriate precautions.

- The incidents occurred during processes of periodic cylinder maintenance of oxygen cylinders;
- The cylinders were safely depressurised and their valves removed;
- The cylinder neck threads were cleaned with an electrical fast rotating iron brush;
- Instant flash fires occurred;
- Operators were using PPE but suffered burns.



Fig. 1 Injured Operator



Fig. 2 Work Tool and Protective Glove



Fig. 3 Cleaning of Cylinder Neck Thread

When the conditions of the fire triangle are met, instant flash fires can occur. This was given for the incidents described above by the fast-rotating brush (energy source), the oxidising atmosphere (residual oxygen) and contamination in the cylinder neck thread (fuel).

EIGA's oxygen eLearning training provides further detailed information.

The recommendations of EIGA when cleaning a cylinder neck thread* are:

- ✓ The work shall only be performed by trained and qualified personal in a clean environment at a retest / maintenance facility. Perform a risk assessment, taking into account the considerations mentioned below.
- ✓ Consider EIGA Document 79/19 *Cylinder Retest Station* that gives guidance on the key aspects of the periodic inspection and retesting of gas cylinders.
- ✓ Be aware and reinforce the awareness of the staff that a cylinder may still contain residual gas after depressurisation and devalving is finished (atmospheric pressure). Special attention shall be paid if this residual gas is either flammable, toxic or oxidising. Remember that the gas service may not be recognisable by the operator due to missing cylinder colour and/or label.
- ✓ Appropriate cleaning or purging steps shall be implemented to the work instruction.

Two options to ensure an inert atmosphere in the cylinder when using a fast rotating electric brush are either purging the cylinder with inert gas and venting, or performing a water pressure test, before cleaning the cylinder neck thread.

Alternatively, clean the cylinder neck thread by a method not inducing ignition energy.

For safe devalving of cylinders also refer to EIGA Info 18, *Devalving Gas Cylinders*.

- ✓ After internal brushing by using a wire brush or shot blasting, ensure that any loose debris, scale, dirt or moisture is removed prior to fitting the cylinder valve.
- ✓ Be aware that the cylinder neck thread can be contaminated by residuals from abrasion debris of cylinder and/or valve material or valve sealants which can provide a source of ignition in an oxidising atmosphere. This includes particularly PTFE tape or cones that can burn.

Be aware that cleaning by using a fast-rotating iron brush will most likely induce enough ignition power to initialise an instant flash fire in an oxidising atmosphere. This may apply to other internal cleaning methods as well, for instance to the shot blasting process.

* the cylinder neck thread is the thread for connecting the valve inlet thread to the cylinder. This is not the thread of the neck ring for fixation of the protection cap.

References

EIGA Doc 79 *Cylinder Retest Station* www.eiga.eu

EIGA Info 18 *Devalving Gas Cylinders* www.eiga.eu

EIGA Doc 04 *Fire Hazards of Oxygen and Oxygen Enriched Atmospheres* www.eiga.eu

EIGA Safety Leaflet 02 *Hazard! Oxygen Enrichment* www.eiga.eu

Safety information on oxygen enrichment is given in the EIGA eLearning on oxygen safety <https://eiga.eu/publications/elearning/>

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